Sibo Chen

Assistant Professor
School of Molecular Sciences, School of Earth and Space Exploration
Arizona State University
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Education

Ph.D. in Geosciences Stony Brook University Aug. 2018 – Dec. 2022
Advisor: Dr. Baosheng Li

M.S. in Geophysics China University of Geosciences (Wuhan) Sept. 2014 – Jul. 2018
Advisor: Dr. Zhenmin Jin and Dr. Xinzhuan Guo

B.S. in Geophysics China University of Geoscience (Wuhan) Sept. 2010 − Jul. 2014

Academic Appointments

Assistant Professor Jan. 2026 – present
School of Molecular Sciences, School of Earth and Space Exploration, Arizona State University

Postdoctoral Research Scholar Jan. 2023 – Dec. 2025
School of Earth and Space Exploration, Arizona State University
Advisor: Dr. Sang-Heon Dan Shim

Research Experience

My research investigates the structure, composition, evolution, and dynamics of planetary interiors by studying minerals at high pressures and temperatures. Using multi-anvil press and laser-heated diamond anvil cell, I investigated how pressure, temperature, and composition affect mineral properties such as phase relations, element partitioning, elasticity, and electrical conductivity. By integrating these experimental results with geophysical and astronomical observations, I aim to constrain models of planetary interiors and their evolutionary processes.

Earth's Interior

Using multi-anvil presses combined with ultrasonic interferometry and synchrotron X-rays, I investigated the sound velocities of mantle minerals at high pressure and temperature. These data provide constraints for interpreting seismic observations of subducted slabs and mantle plumes. Additionally, I studied the electrical conductivity of mantle minerals and fluids under high-pressure conditions. This research provides insights into tracking elements like potassium and hydrogen within the Earth, helping to explain processes like dehydration in subducting tectonic plates.

Planetary Interiors Beyond Earth

Using the laser-heated diamond anvil cell, I am investigating how key elements like hydrogen and potassium behave at planetary boundaries to clarify their role on planetary evolution and core formation. Another component of my current work involves developing novel analytical methods, particularly vibrational electron energy loss spectroscopy (vibEELS), to achieve nanoscale insights into the distribution and state of hydrogen in high-pressure materials.

Publications

1. **Sibo Chen**, Siheng Wang, Xintong Qi, Tony Yu, Man Xu, Yanbin Wang, Baosheng Li. Invisible water in subducted crust: Lawsonite velocity anomalies under mantle conditions. *Proceedings of the National Academy of Sciences*, 2025 (122). https://doi.org/10.1073/pnas.2506548122
2. **Sibo Chen**, Siheng Wang, Xintong Qi, Tony Yu, Man Xu, Yanbin Wang, Baosheng Li. Sound velocities of stishovite at simultaneous high pressure and high temperature suggest an eclogite-rich layer beneath the Hawaii hotspot. *Geophysical Research letters*, 2024 (51). https://doi.org/10.1029/2023GL107700

3. **Sibo Chen**, Nao Cai, Siheng Wang, Xintong Qi, Baosheng Li. Implications of sound velocities of natural topaz on the seismic L-discontinuity. *Geophysical Research letters*, 2022 (49). https://doi.org/10.1029/2021GL095107
4. **Sibo Chen**, Xinzhuan Guo, Takashi Yoshino, Zhenmin Jin, and Ping Li. Dehydration of phengite inferred by electrical conductivity measurements: implication for the high conductivity anomalies relevant to the subduction zones. *Geology*, 2018(46): 11-14. https://doi.org/10.1130/G39716.1
5. **Sibo Chen**, Xinzhuan Guo, Chunyin Zhou, and Zhenmin Jin. Negative pressure effect on the electrical conductivity of San Carlos olivine and its implication to the electrical structure in the upper mantle. *Science China (Earth Sciences)*, 2016(59): 2078-2088. https://doi.org/10.1007/s11430-015-0216-y
6. Wen-Yi Zhou, Ming Hao, Wenhao Su, Taehyun Kim, **Sibo Chen**, Sang-Heon Shim, Dongzhou Zhang, Phuong Q. H. Nguyen, Katherine Armstrong, and Jin S. Zhang. Elasticity of davemaoite as a primary contributor to lower-mantle heterogeneities, *Science*, 2025(390): 935-39. https://doi.org/10.1126/science.adx8356
7. Siheng Wang, **Sibo Chen**, Man Xu, Tony Yu, Yanbin Wang, Baosheng Li, Sound velocities and thermal equation of state of fcc-iron-nickel alloys at high pressure and high temperature: Implications for the cores of Moon and several planets, *Earth and Planetary Science Letters*, 2025(649): 119118. https://doi.org/10.1016/j.epsl.2024.119118
8. Siheng Wang, **Sibo Chen**, Xintong Qi, Man Xu, Tony Yu, Yanbin Wang, Baosheng Li, Reassessment of Birch's Law on hcp-Fe from Ultrasonic Sound Velocity Measurement and Implications on the Velocity Profiles of Earth's Inner Core, *Journal of Geophysical Research: Solid Earth*, 2024(129): e2023JB027979. https://doi.org/10.1029/2023JB027979
9. Jiawei Zhang, Siheng Wang, **Sibo Chen**, Baosheng Li, Qiong Liu. Sound velocities of natural clinohumite at high pressures and implications for seismic velocities of subducted slabs in the upper mantle. *Physics of the Earth and Planetary Interiors* 2023(341): 107052. https://doi.org/10.1016/j.pepi.2023.107052
10. Xinzhuan Guo, **Sibo Chen**, Yunke Song, Yao Wu, Xiang Wu, and Junfeng Zhang. Origin of the High Conductivity Anomalies in the Mid-Lower Crust of the Tibetan Plateau: Dehydration Melting of Garnet Amphibolites. *Lithos*, 2023(436): 106988. https://doi.org/10.1016/j.lithos.2022.106988
11. Xinzhuan Guo, **Sibo Chen**, Ping Li, Yanfei Zhang, Xiang Wu, and Junfeng Zhang. Phase transition of sanidine ($KAlSi_3O_8$) and its effect on electrical conductivity at pressures up to 11 GPa. *Physics and Chemistry of Minerals*, 2020(47): 21. https://doi.org/10.1007/s00269-020-01089-4
12. Xinzhuan Guo, Takashi Yoshino, **Sibo Chen**, Xiang Wu, Junfeng Zhang. Partial dehydration of brucite and its implications for water distribution in the subducting oceanic slab. *Geoscience Frontiers*, 2022 (13): 10342. https://doi.org/10.1016/j.gsf.2021.101342
13. Xintong Qi, Siheng Wang, **Sibo Chen**, Baosheng Li. Anomalous elastic behavior of tantalum at high pressures: Experimental and theoretical studies. *International Journal of Refractory Metals and Hard Materials*, 2021(101): 105691. https://doi.org/10.1016/j.ijrmhm.2021.105691
14. Siheng Wang, Nao Cai, Xintong Qi, **Sibo Chen**, Baosheng Li. Sound velocities of iron-nickel ($Fe_{90}Ni_{10}$) alloy up to 8 GPa and 773 K: The effect of nickel on the elastic properties of bcc-iron at high P-T. *American Mineralogist*, 2021(106): 1744-1750. https://doi.org/10.2138/am-2021-7716
15. Ping Li, Xinzhuan Guo, **Sibo Chen**, Chao Wang, Junlong Yang, Xingfan Zhou. Electrical conductivity of the plagioclase-NaCl-water system and its implication for the high conductivity anomalies in the mid-lower crust of Tibet Plateau. *Contributions to Mineralogy and Petrology*, 2018(173): 16. https://doi.org/10.1007/s00410-018-1442-9

Professional Society Memberships

1. Member of the American Geophysical Union (AGU)
2. Member of the Geological Society of America (GSA)
3. Member of the American Physical Society (APS)